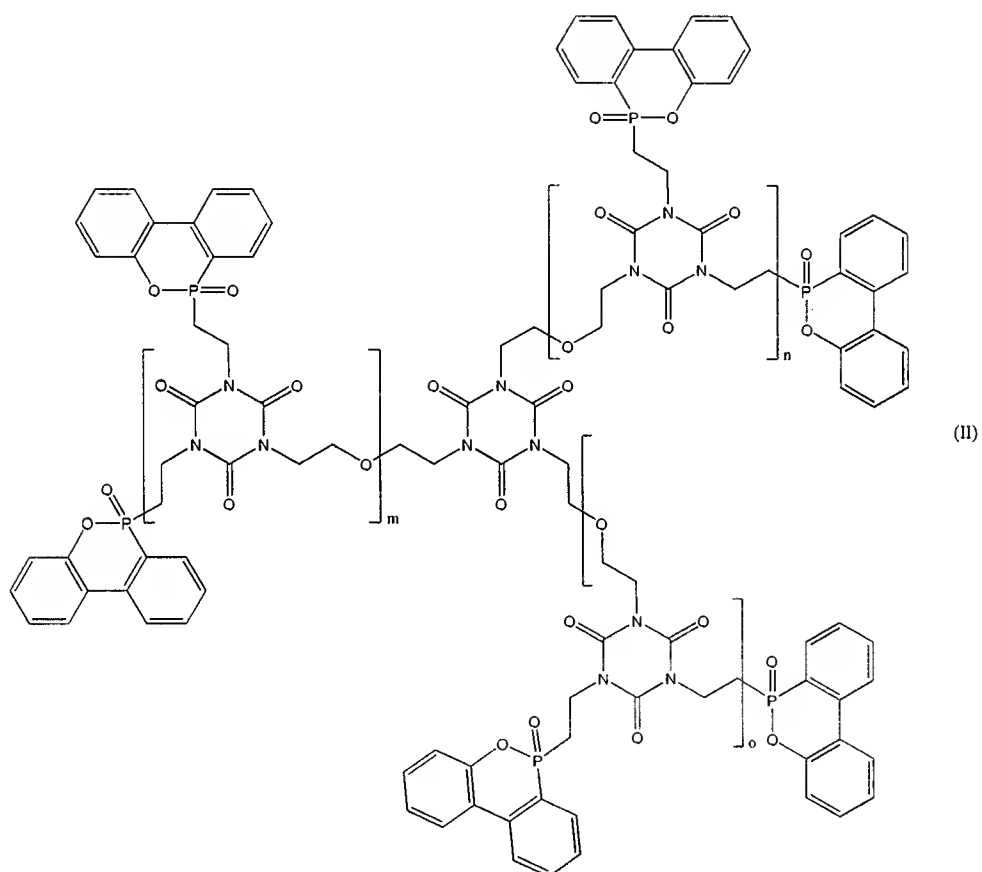
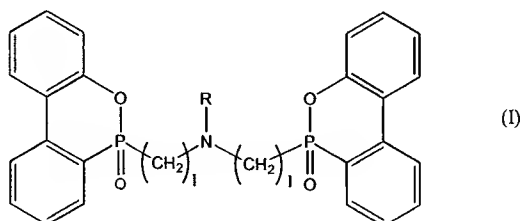
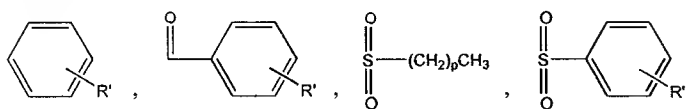


Claims

1. A process for preparation of nitrous bridged derivatives of 6H-dibenz[c,e][1,2]-oxaphosphorine-6-oxides of Formulae (I) and (II)



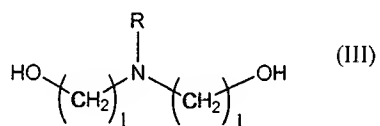
wherein R is one of the following radicals:

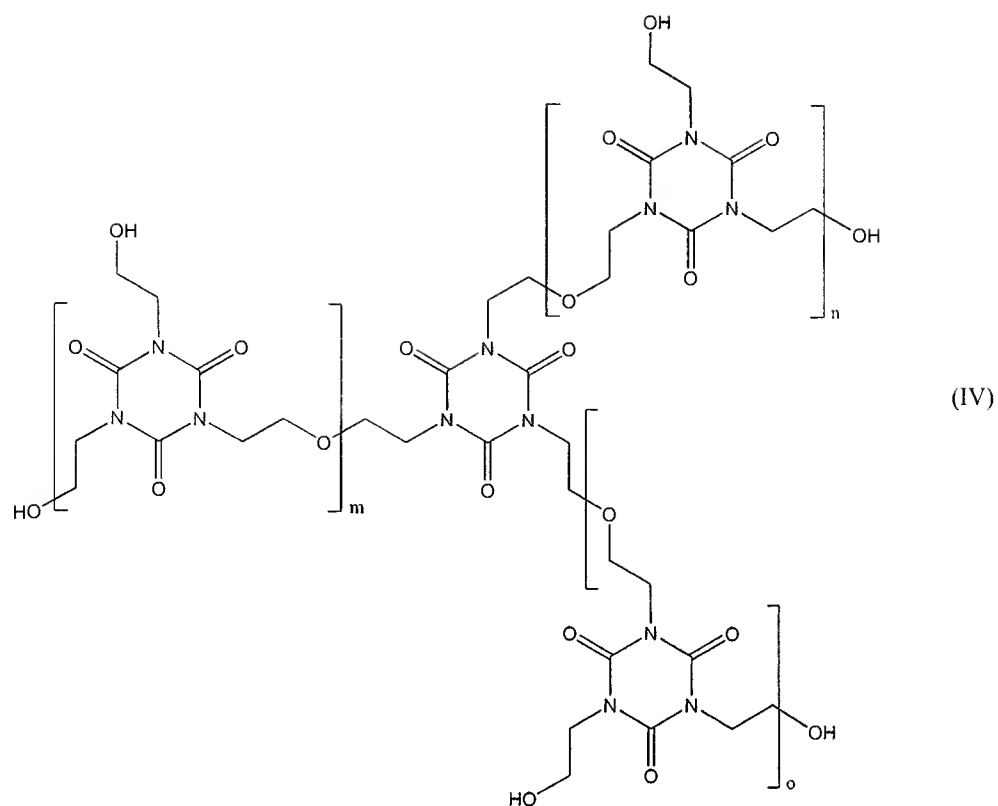


wherein I is an integer of from 2 to 10, m and p are integers of from 1 to 20, n and o

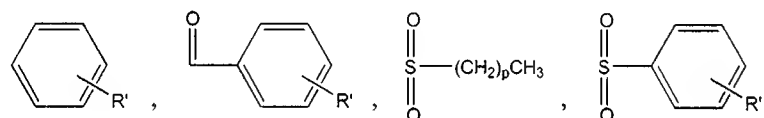
are integers from 0 to 20 and R' is hydrogen or alkyl wherein:

- (a) a 6-alkoxy-6H-dibenz[c,e][1,2]-oxaphosphorine is reacted with a bishydroxyalkyl amine or a polyvalent alcohol formed by polycondensation of 1,3,5-tris(2-hydroxyethyl)cyanuric acid, to form an intermediate product and
 - (b) said intermediate product obtained in step (a) is converted by adding a catalytic amount of an alkylating agent to a nitrous bridged 6H-dibenz[c,e][1,2]-oxaphosphorine-6-oxide derivative of the Formula (I) or (II).
2. The process according to claim 1, characterized in that in step (a) is used a bishydroxyalkyl amine of the Formula (III) or a polyvalent alcohol of the Formula (IV)



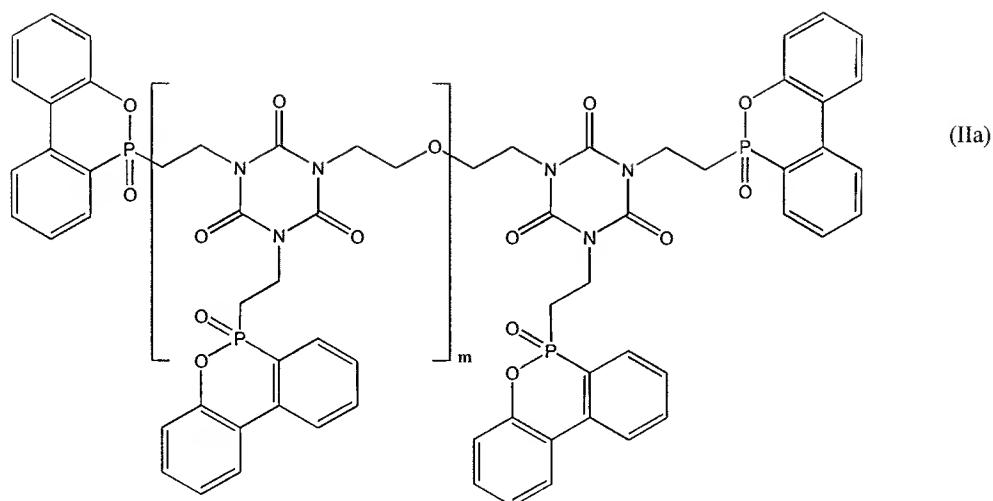


wherein R is one of the following radicals:



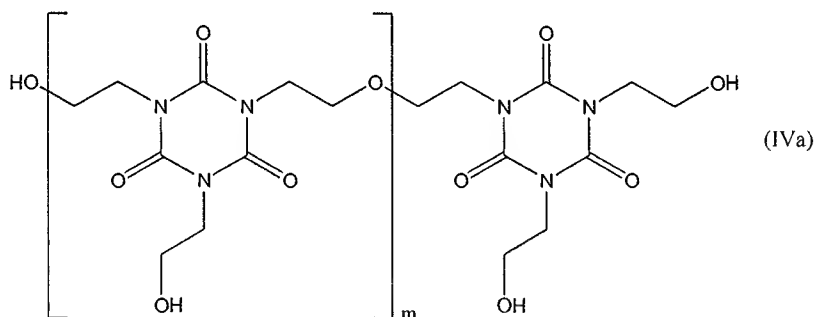
wherein l is an integer from 2 to 10, m and p are integers from 1 to 20, n and o are integers from 0 to 20, and R' is hydrogen or alkyl.

3. The process according to claim 1 or claim 2, characterized in that there is produced nitrous bridged derivatives of 6H-dibenz[c,e][1,2]-oxaphosphorine-6-oxides of the Formula (IIa)



which derive from nitrous bridged derivatives of 6H-dibenz[c,e][1,2]-oxaphosphorine-6-oxides of the Formula (II) in which m is an integer of from 1 to 20, and n and o are 0.

4. The process according to any one of claims 1 to 3, characterized in that in step (a) is used a polyvalent alcohol of the Formula (IVa)



derived from the polyvalent alcohol of the Formula (IV) in which m is an integer from 1 to 20 and n and o are 0.

5. The process according to claim 1 or claim 2, characterized in that a bishydroxyalkyl amine where R is a phenyl or p-toluenesulfonyl group is used in step (a).

6. The process according to claim 2 or claim 5, characterized in that bis(hydroxyethyl) phenyl amine or bis(hydroxyethyl)p-toluenesulfonylamine is used as

bishydroxyalkyl amine in step (a).

7. The process according to any one of claims 1 to 6, characterized in that 6-ethoxy-6H-dibenz[c,e][1,2]-oxaphosphorine is used in step (a).

8. The process according to any one of claims 1 to 7, characterized in that in step (b) an alkylating agent is used which is selected from the group consisting of sulfuric acid esters and sulfonic acid esters.

9. The process according to claim 8, characterized in that the alkylating agent used in step (b) is p-toluene sulfonic acid methyl ester.

10. The process according to any one of claims 1 to 9, characterized in that the alcohol formed in step (a) is removed.

11. The process according to any one of claims 1 to 10, characterized in that steps (a) and (b) are carried out in a single reaction vessel.

12. The process according to any one of claims 1 to 11, characterized in that in a reaction vessel equipped with a reflux cooler and stirrer the following steps are subsequently carried out while constantly stirring:

(a) 6-ethoxy-6H-dibenz[c,e][1,2]-oxaphosphorine and the bishydroxyalkyl amine or the polyvalent alcohol are put at room temperature in the reaction vessel and mixed with each other;

(b) the mixture obtained is heated while simultaneously distilling off of ethanol generated;

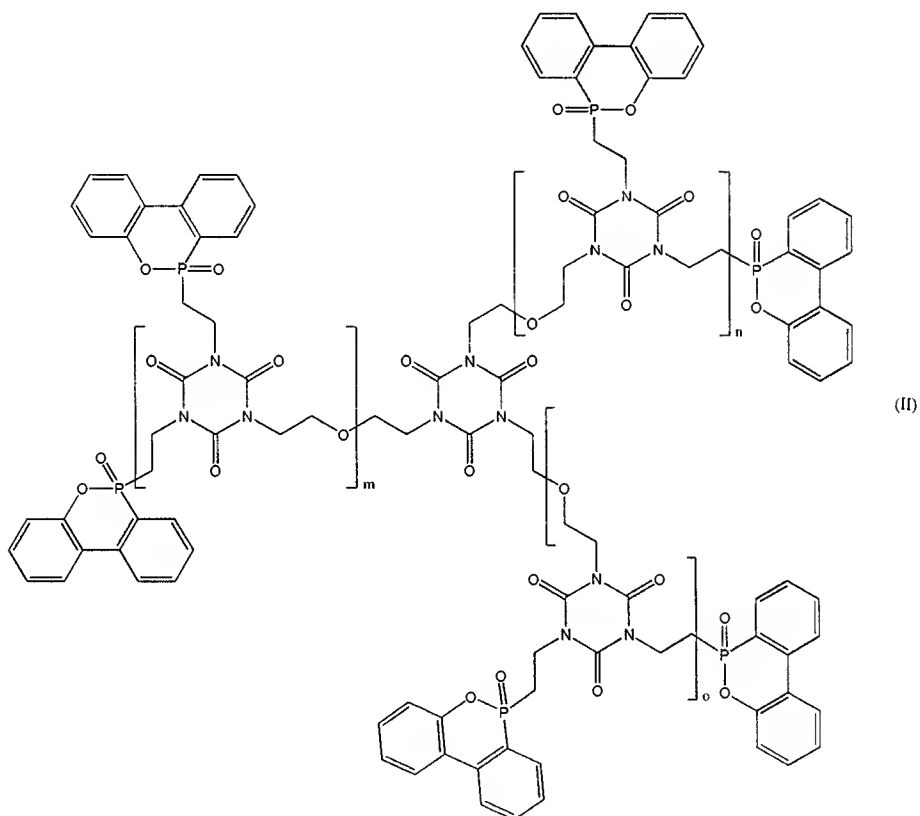
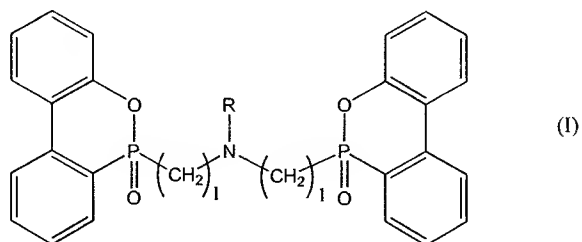
(c) the p-toluene sulfonic acid methyl ester is added to the distillation residue, and the mixture obtained is heated

after which the compound of Formula (I) or (II) is separated and, optionally, cleaned and dried.

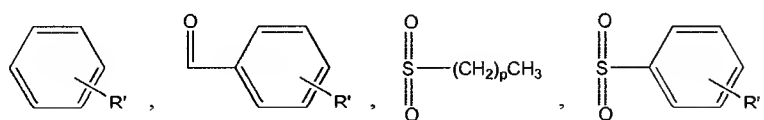
13. The process according to claim 12, characterized in that subsequent to step (b)

excess 6-ethoxy-6H-dibenz[c,e][1,2]-oxaphosphorine is distilled off under high-medium vacuum (0.01 – 0.001 mbar).

14. Nitrous bridged derivatives of 6H-dibenz[c,e][1,2]-oxaphosphorine-6-oxides of the Formulae (I) and (II)



wherein R is one of the following radicals:

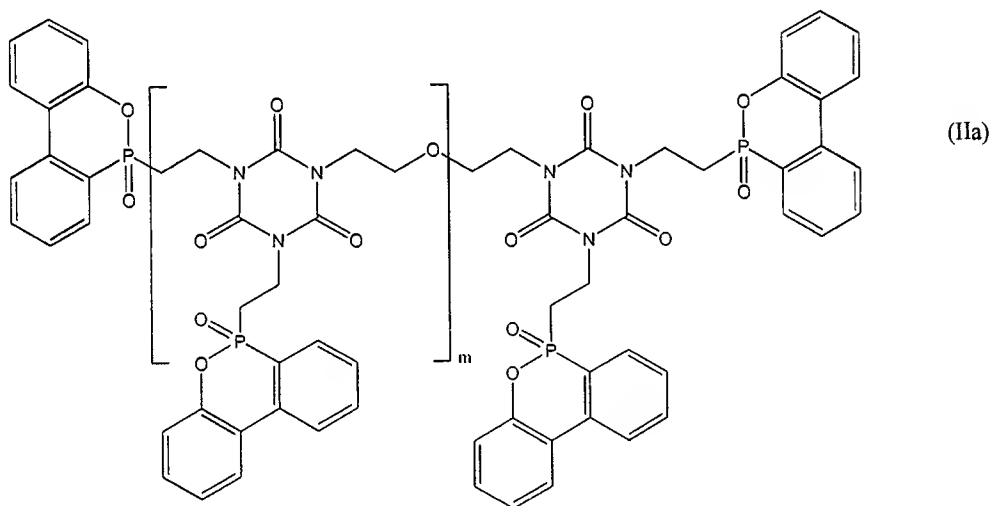


l an integer from 2 to 10, m and p are integers from 1 to 20, n and o are integers of from 0 to 20 and R' is hydrogen or alkyl.

15. Nitrous bridged derivatives of 6H-dibenz[c,e][1,2]-oxaphosphorine-6-oxides according to claim 14, characterized in that R is a phenyl or a p-toluenesulfonyl group.

16. Nitrous bridged derivatives of 6H-dibenz[c,e][1,2]-oxaphosphorine-6-oxides according to claim 14 or 15, characterized in that R is a phenyl or a p-toluenesulfonyl group and l equals 2.

17. Nitrous bridged derivatives of 6H-dibenz[c,e][1,2]-oxaphosphorine-6-oxides according to claim 14, characterized by having a structure of the Formula (IIa)

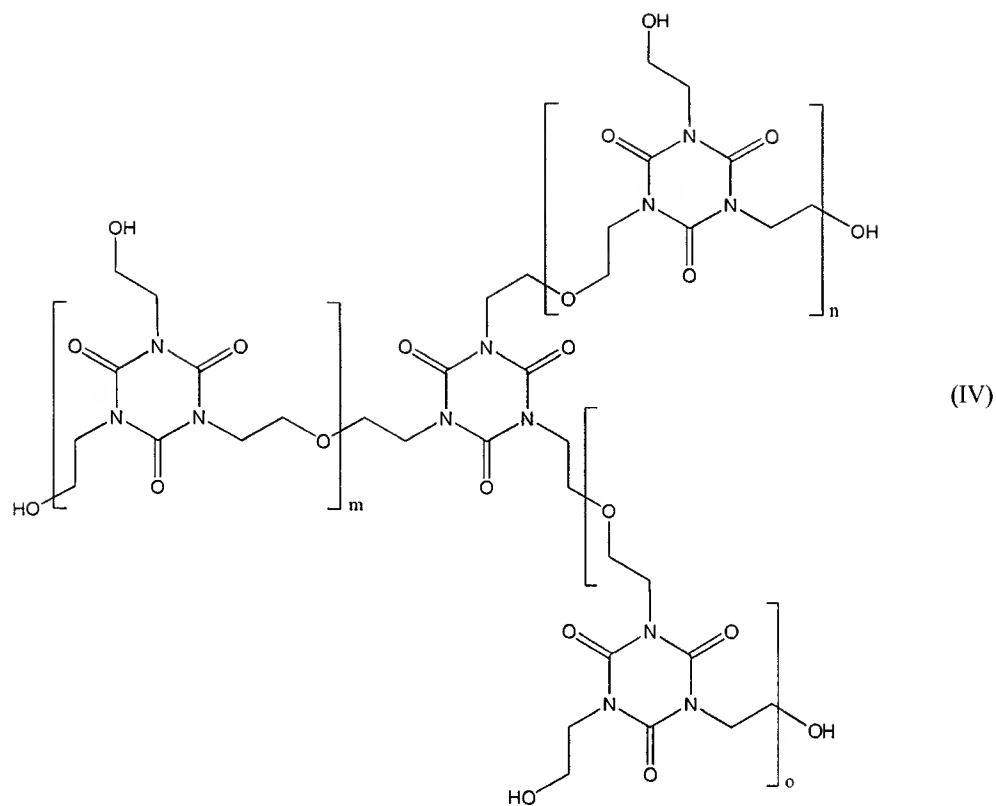


derived from Formula (II) in which m is an integer of from 1 to 20 and n and o are 0.

18. Use of 6H-dibenz[c,e][1,2]-oxaphosphorine-6-oxide derivatives prepared by a process according to any one of claims 1 to 13 as flameproofing agents for polymers and products prepared therefrom.

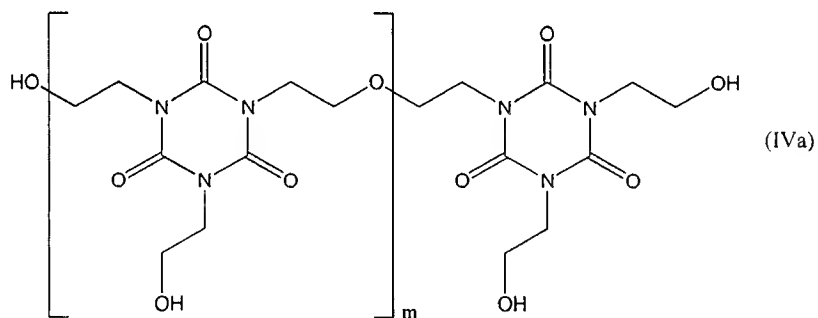
19. The use of claim 18 as flameproofing agents for polyesters, polyamides, polycarbonates, polystyrenes, polyethylenes, polypropylenes, phenolic and epoxy resins.

20. Oligomers of the 1,3,5-tris(2-hydroxyethyl)cyanuric acid of the Formula (IV)



wherein m is an integer from 1 to 20 and n and o are integers from 0 to 20.

21. The oligomers according to claim 20, having the Formula (IVa)



the structure of which derives from Formula (IV) in which m is an integer from 1 to 20 and n and o are 0.